

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

FILE COPY

United States
Department of
Agriculture
Forest Service
Southern Region

Reserve
aSB952
.86
.W57
1984

SAFETY TRAINING for on-the-ground Herbicide Applicators

David M. Webb

A SELF STUDY GUIDE

for

(Name)

(Date)



Prepared by:

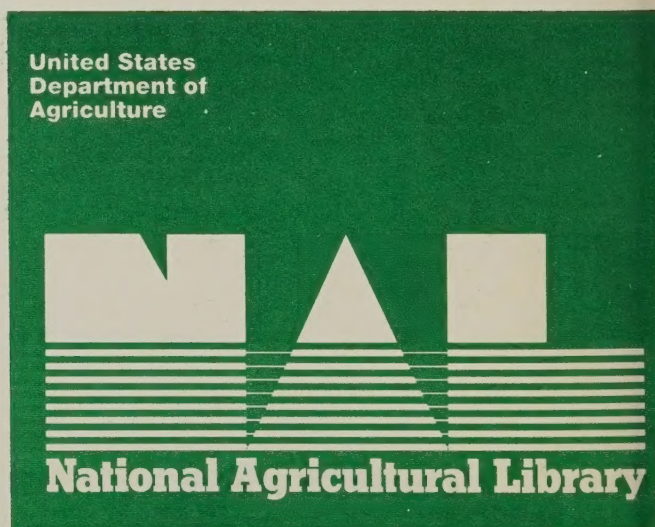
Max Williamson
Regional Pesticide Specialist
USDA Forest Service
Forest Pest Management
1720 Peachtree Road, N.W.
Atlanta, Georgia 30367

Phone: 404-881-7934
FTS: 257-7934

Edited and designed by:

Charles I. Shade
Public Affairs Officer
USDA Forest Service
Southern Region
Oxford, Mississippi 38655

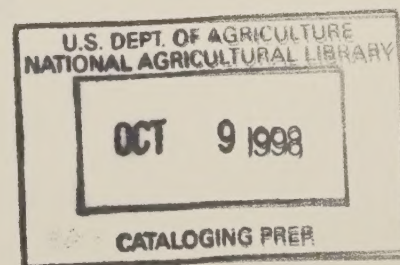
May 1984



SAFETY TRAINING FOR HERBICIDE APPLICATORS

CONTENTS

	PAGE
Preface	i
Introduction	iii
Toxicity	1
Pesticide Labelling and Registration	10
Herbicides, Mixing and Applying	17
Transportation	25
Storage and Spills	34
Review of Application Practices	37
Self Test #1	8
Self Test #2	14
Self Test #3	23
Self Test #4	27
Self Test #5	32
Self Test #6	36
Toxicity Self Test #1 Answers and Discussion	39
Pesticide Labelling and Registration Self Test #2 Answers and Discussion	40
Herbicide, Mixing and Applying Self Test #3 Answers and Discussion	41
Transporting Herbicides Self Test #4 Answers and Discussion	42
Storage and Spills Self Test #5 Answers and Discussion	43
Disposal of Containers Self Test #6 Answers and Discussion	44

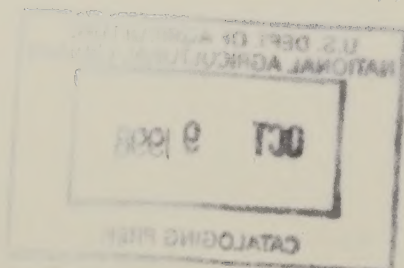


SAFETY TRAINING FOR FERTILIZER APPLICATION

CONTENTS

PAGE

1	Foreword
2	Introduction
3	Objectives of the Course
4	General Information
5	Personal Safety and Hygiene
6	Transportation
7	Storage and Handling
8	Application Procedures
9	Test 1
10	Test 2
11	Test 3
12	Test 4
13	Test 5
14	Test 6
15	Test 7
16	Test 8
17	Test 9
18	Test 10
19	Test 11
20	Test 12
21	Test 13
22	Test 14
23	Test 15
24	Test 16
25	Test 17
26	Test 18
27	Test 19
28	Test 20
29	Test 21
30	Test 22
31	Test 23
32	Test 24
33	Test 25
34	Test 26
35	Test 27
36	Test 28
37	Test 29
38	Test 30
39	Test 31
40	Test 32
41	Test 33
42	Test 34
43	Test 35
44	Test 36
45	Test 37
46	Test 38
47	Test 39
48	Test 40
49	Test 41
50	Test 42
51	Test 43
52	Test 44
53	Test 45
54	Test 46
55	Test 47
56	Test 48
57	Test 49
58	Test 50
59	Test 51
60	Test 52
61	Test 53
62	Test 54
63	Test 55
64	Test 56
65	Test 57
66	Test 58
67	Test 59
68	Test 60
69	Test 61
70	Test 62
71	Test 63
72	Test 64
73	Test 65
74	Test 66
75	Test 67
76	Test 68
77	Test 69
78	Test 70
79	Test 71
80	Test 72
81	Test 73
82	Test 74
83	Test 75
84	Test 76
85	Test 77
86	Test 78
87	Test 79
88	Test 80
89	Test 81
90	Test 82
91	Test 83
92	Test 84
93	Test 85
94	Test 86
95	Test 87
96	Test 88
97	Test 89
98	Test 90
99	Test 91
100	Test 92
101	Test 93
102	Test 94
103	Test 95
104	Test 96
105	Test 97
106	Test 98
107	Test 99
108	Test 100



SAFETY TRAINING FOR HERBICIDE

APPLICATORS

PREFACE

Intent of Training

This booklet is written to help train Forest Service employees to work safely with herbicides (chemicals which kill or control plants).

The training is for people who work with herbicides in the field. It is not meant to teach the use of particular herbicides, when and how much to apply, or the handling of application contracts, although some of those things will be talked about.

Objective

The purpose of this training is to give workers enough know-how and skill to keep themselves safe, and not harm the land and surroundings when herbicides are being used.

Procedures for Training

Each section of this study guide covers a number of facts, followed by a self-test. Three sections do not have self-tests: this preface, the "Introduction," and "Review of Application Practices."

Read each section carefully before you answer the self-test questions. These questions are written to help you remember important facts. They will not be graded.

The District Pesticide Coordinator is in charge of this training. If you have a question or do not understand any of the material, check with this person. Work at your own speed. You may go back and review any section. In fact, it is a good idea.

Answers and Discussion for Each Section

Answers to the self-test questions are in the back of the book. Only after you take the self-test should you read the answers. The answers and discussion should help clear up any points you are not sure of. If they do not, ask questions.

Examinations

After you finish a number of sections, you will be asked to check with your District Pesticide Coordinator for a test. This one will be graded. If you pass the examination, you will go on to the next section. If you do not pass the examination, you will have to study the material again. If you need help on any of the material before or during your review, ask questions.

Each examination will have multiple choice and true - false questions. A score of 70 or better is passing.

There are no trick questions. But on some questions you must pay close attention, to pick the best answer.

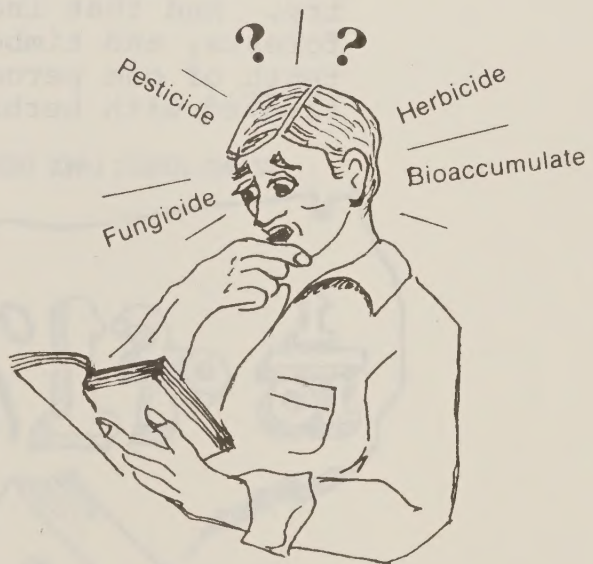
INTRODUCTION

The greatest thing about the Forest Service is its people. The Forest Service has many responsibilities to all the people of this country, and it could not do its job without employees who know what they are doing, who are hard working, and who are dedicated and concerned. So we must be concerned and interested in the progress, safety, health and welfare of each worker.

The main reason for this training is to give you a basic knowledge of the materials you will be using to control unwanted weeds, grasses, and trees. An understanding of safe methods of application, protective clothing and equipment, and proper clean-up procedure will give you a safe and healthy working area.

As you read this booklet, you will find a number of long words, many of them new to you. You will have to learn them in order to study and talk about the work you will be doing. If you are unsure of a word or do not know how to pronounce it, ask for help.

Pesticides are chemicals that control, prevent, destroy, or regulate forms of life that are pests. Pests are forms of life that are unwanted at that time and place. Some pesticides are more toxic (poisonous) than others to human beings. Herbicides, those that work on plants, are generally the least toxic to human beings.



Some others are:

Insecticides - pesticides that kill or control insects.

Fungicides - pesticides that kill or control fungi.

Rodenticides - pesticides that kill or control rodents (rats, mice, others).

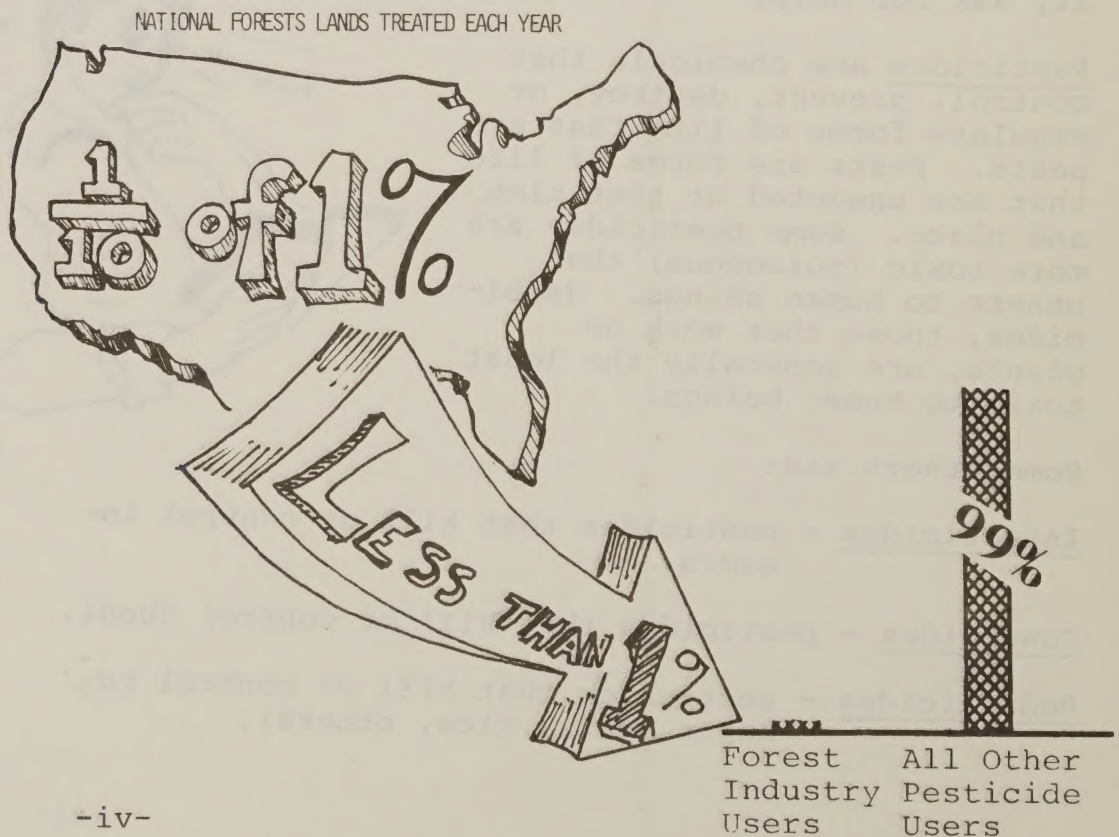
Insect repellants - pesticides usually used on a person or animal to keep off insects, ticks, chiggers and the like.

Herbicides used to control plants or algae in ponds, lakes, rivers and other bodies of water are called aquatic herbicides.

To use a herbicide safely you must know how toxic that chemical is. This is called its toxicity. You must know how to handle these chemicals, how to store, mix, and apply them safely; how to clean up small spills; how to dispose of containers; and how to prepare the required incident and accident reports.

Herbicides used in growing trees are used for many other purposes. They are used by many industries, and they are widely used by farmers for growing food crops. Many homeowners use them to kill weeds around their homes. In fact, the largest users of herbicides are industry, farmers, and homeowners.

Less than one percent of all the pesticide used in the United States is used by forest industry. And that includes the Forest Service, state forests, and timber companies. Only about one-tenth of one percent of National Forest land is treated with herbicides each year. Even that small



area is not treated very often. Some acres will be treated once or twice every 60 or more years.

The Forest Service uses fire and mechanical means as well as pesticides in its management of forests. Pesticides are used only after a thorough study shows that their effects, costs, and possible danger to the environment safely fit the needs of the user.

If we did not control the unwanted, harmful vegetation in our forests, we could no more grow trees for homes and industry than a farmer could grow our food in a field choked with weeds and grass.

TOXICITY

Our world is made up of chemicals. The air we breathe, the water we drink, the food we eat, and the medicine we take are all chemicals of many kinds. Hundreds of years ago a man called Paracelsus said, "The difference between a medicine and a poison is the dosage." This is still true today. That is why the label on a medicine telling you how much to take is so important. Taking too much aspirin can kill.

The caffeine in coffee and the nicotine in cigarettes are poisonous chemicals. People who use them are not poisoned because they take in small quantities which do not build up in the body.

Generally, such chemicals pass from the body, in one form or another, with waste products. Since this happens fairly fast, the chemicals do not build up to a level high enough to poison us. In the same way, the chemical herbicides used today by the Forest Service pass through if they do enter the body.

The good life that we have come to expect depends on many everyday chemicals around us. Today's foods are often dependent on fertilizers and pesticides. Without these chemicals, getting enough food would take all the time of most of us. And we wouldn't live as long doing it. Since 1900, the average life span in the United States has increased from about 47 years to over 70 years. This has come about to a large extent through the knowledge and use of modern chemicals.

Words and terms to understand:

Toxic - Poisonous.

Toxicity - The measure of a chemical's ability to produce injury; how poisonous it is.

LD50 - The amount of chemical that will kill half the test animals who take it. LD50 stands for "lethal dose, 50 percent," a common way to express the toxicity of a substance.

Hazard - Adding toxicity to the amount of a substance and length of time; the sum of toxicity plus exposure.

Acute Toxicity - How poisonous a substance is to an animal or person after a single dose (exposure).

Chronic Toxicity - The ability of a substance to cause injury or death after a long exposure.

Oral Toxicity - The ability of a substance to cause injury or death if swallowed.

Dermal Toxicity - The ability of a substance to cause injury or death if passed through unbroken skin.

mg/kg (milligram per kilogram) - A way to express an amount of chemical per animal weight.

PPM (parts per million) - A way to express the amount of pesticide in food, plants, animals. (One ppm is equal to about 1 ounce in 62,500 pounds, or 1 tablespoon in 3,906 gallons.)

PPB (parts per billion) - Another way to express the amount of pesticide in foods, etc. A smaller amount of pesticide than ppm. (One ppb is equal to about 1 ounce in 62,500,000 pounds, or 1 tablespoon in 3,906,000 gallons.)

Discussion

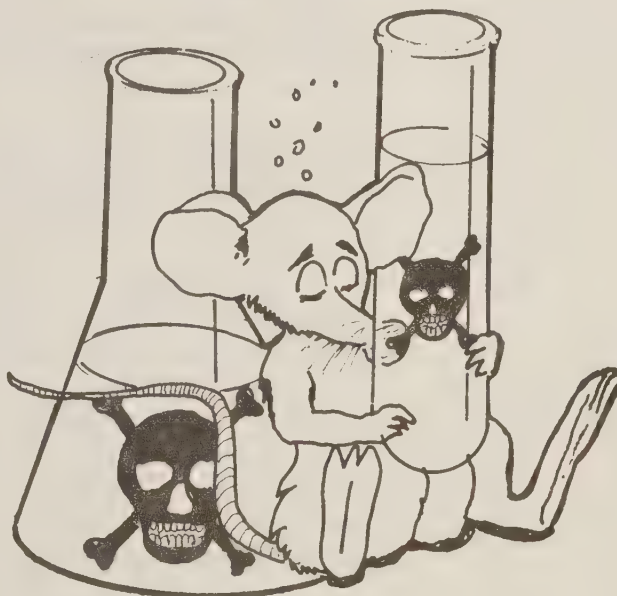
Toxicity is the capacity of a substance to produce injury. Given enough of it, most chemicals are toxic in some degree to plants, animals and human beings. Some pesticides are almost non-toxic; others are highly poisonous. They vary in toxicity. Insecticides, for instance, are generally much more toxic to animals and people than are herbicides.

To better understand pesticides we need to look more closely at the terms toxicity and hazard. As we said, toxicity is the capacity of a substance to cause injury. Hazard includes two factors - the sum of the toxicity plus the exposure to a toxic pesticide. For example, you can handle a sealed container of a very toxic chemical and never become exposed. But if the container leaked while it was in your hands, you might be exposed. So the combination of a highly toxic chemical in a

leaky container would create a hazard. The hazard of a chemical, then, is a measure of the risk to the user.

To understand just how toxic some chemicals are, we need to understand how toxicity is measured. Test animals, such as mice, rats, and rabbits, are specially bred for the laboratory. They are generally used for the first testing of chemicals by being fed a measured dosage of the chemicals (oral exposure). Some are allowed to breathe measured amounts (inhalation exposure). And some have their skin and eyes exposed to the chemical (dermal exposure).

By testing a large number of animals, scientists quickly find a dosage of the chemical which makes some of the animals sick and causes others to die. Additional testing shows the amount of chemical needed to kill half (50 percent) of the animals tested. The amount needed to kill 50 percent of the test animals is called the "lethal dose, 50 percent" or LD50. This is sometimes called the "lethal concentration" or LC50. As a part of the dermal exposure tests, the scientists check the skin and eyes of test animals for irritation and damage. These tests are a start to establishing standard measures of toxicity. These can later be related to human beings.



LD50s are generally shown as a comparison between the weight of the chemical and the weight of the test animal. For example, milligrams (mg) of pesticide are compared to kilograms (kg) of body weight of the test animal. This is written mg/kg. There are 1 million milligrams (mg) in 1 kilogram (kg).

For any LD50, the smaller the number of milligrams per kilogram, the more toxic the chemical. The smaller the weight of the chemical per weight of the animal, the more toxic. In other words, less chemical is needed to have a 50 percent chance of killing the animal. A chemical with an LD50 of 2 mg/kg is a lot more toxic than a chemical with an LD50 of 200 mg/kg.

In fact, if the LD₅₀ of a chemical is 1 mg/kg, and a second chemical is 10 mg/kg, the first is 10 times more toxic than the second. In another example, if the first chemical has an LD₅₀ of 1 mg/kg, and a second is 1,000 mg/kg, then the first is 1,000 times more toxic than the second.

When a single dose of a chemical is given, or when a single exposure to a chemical happens, it is called an "acute" exposure. So, acute dermal exposure means a single dose on the skin, acute oral refers to a single dose taken by mouth, and acute inhalation means a single dose through the nose.

When there is one exposure after another, repeated or continuous exposure to a pesticide, it is called "chronic" exposure. So toxicity can be described in terms of chronic dermal, chronic oral, or chronic inhalation toxicity. Scientists use experimental animals to check for chronic toxicity. They check by feeding measured doses to some animals over a long period of time. They also investigate the chronic effects through several generations of animals to check effects on offspring.

There are three common ways for pesticides to enter the human body: through the skin, including the eyes; through the mouth; and through the lungs.

Accidental oral exposure happens most often when pesticides are stored in unlabeled bottles or food containers instead of in their original labeled containers. Too many documented cases tell of people, especially children, drinking pesticides from soft drink bottles - or bottles that look like drink bottles. Accidents can occur when someone drinks water stored in containers that once held pesticides or other toxic chemicals.

Based on the toxicity of a chemical and the weight of the person, an estimate for an LD₅₀ can be made. See Table 1 for this comparison in ounces (ozs) and pounds (lbs). This table is based on the toxicity of 14 pesticides and 4 other chemicals.

REMEMBER! When a pesticide is mixed with water, the toxicity of the mixture decreases as the amount of water increases - more water, less toxicity.

Examples

If 1 gallon of a pesticide is mixed with 1 gallon of water, the toxicity of the mixture is 50 percent less than the original pesticide, since the mixture is half water and half pesticide. When 1 gallon of a pesticide is mixed with 20 gallons of water, the toxicity of the mixture is reduced about 95 percent.

So keep this in mind: The greatest chance for dangerous exposure to a toxic substance is when handling, moving, and mixing pesticides in or from their original containers. When the pesticide is already mixed and ready for use, there is less danger from exposure. With pre-mixed herbicides such as Tordon 101-R and Banvel CST, their toxicity is reduced as a result of premixing.

TABLE 1 -- Estimated acute oral and dermal toxicity for 18 chemicals on a 175 pound person

The estimated toxicity for the pesticides is based on the formulated product (as in the container before mixing.)

	ORAL LD50	TOXICITY TERMS	DERMAL LD50
NICOTINE	0.02 (comparison only)	Extremely Toxic	
METHYL* PARATHION 80%	0.03	Extremely Toxic	1 oz
CAFFEINE	0.21 (comparison only)	Extremely Toxic	
LINDANE (20%)*	2 oz	Moderately Toxic	3 oz
SEVIN (50%)	2 oz	Moderately Toxic	11 oz
ASPIRIN	3-1/2 oz (comparison only)	Moderately Toxic	
2,4-D	3-7 oz	Moderately Toxic	4 oz
MALATHION (91%)	4 oz	Moderately Toxic	12 oz
TABLE SALT	9 oz (comparison only)	Moderately Toxic	
BANVEL	7 oz	Moderately Toxic	6 oz
BANVEL CST	14 oz	Slightly Toxic	6 oz
GARLON	7 oz	Moderately Toxic	11 oz
TORDON 101*	8 oz	Moderately Toxic	7 oz
TORDON 101R	18 oz	Slightly Toxic	11 oz
OUST	14 oz	Slightly Toxic	6 oz
PRONONE 10G	14 oz +	Slightly Toxic	
ROUNDUP	15 oz	Slightly Toxic	14 oz
VELPAR L	20 oz	Slightly Toxic	15 oz

*Restricted Use Pesticide

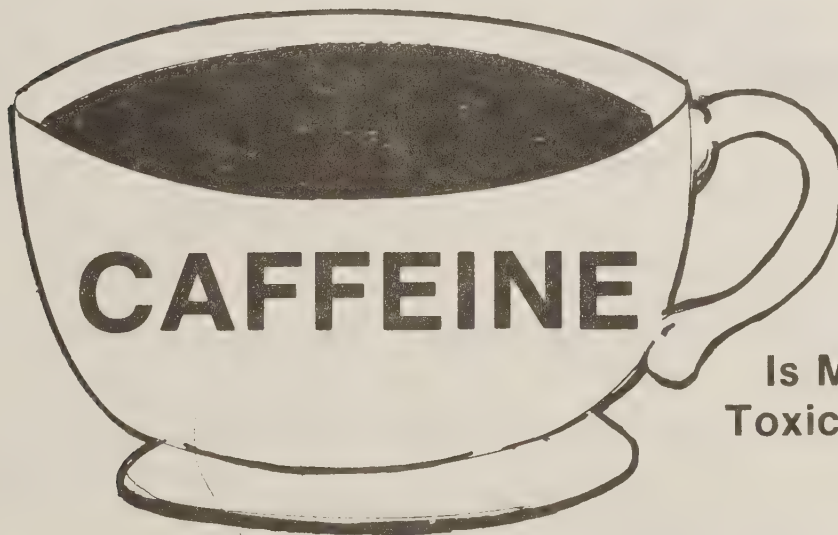
Most LD50's are expressed as a range, reflecting experimental conditions, type carrier, species of test animals, preciseness of the tests, etc. These estimates fall within that range, and are only projections based on animal tests.



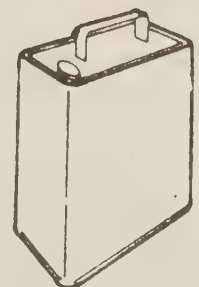
Is More
Toxic Than



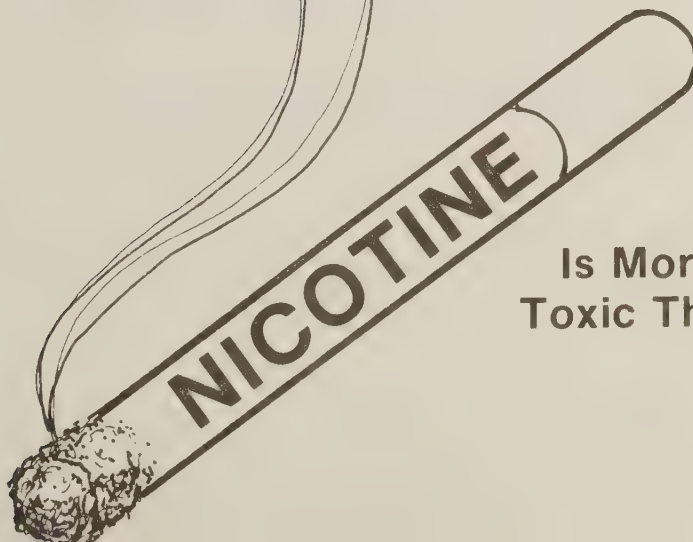
Tordon



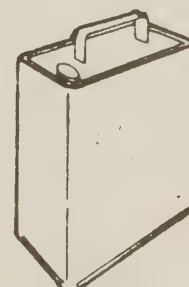
Is More
Toxic Than



Roundup



Is More
Toxic Than



Velpar L

TOXICITY
Self Test #1

1. The capacity of a substance to produce injury is called its:
☐ a. Hazard
☐ b. Risk
☐ c. Toxicity

2. We are continually exposed to poisonous substances such as caffeine in coffee and nicotine in cigarettes, but we are not poisoned because the quantities are very small and --
☐ a. The substances are not toxic
☐ b. The body does not retain them
☐ c. They have no oral toxicity level.

3. The average human life span in the United States has been --
☐ a. Decreasing
☐ b. Increasing
☐ c. Remaining the same

4. The ability of a chemical to produce injury if passed through the skin is its --
☐ a. Dermal toxicity
☐ b. Oral toxicity
☐ c. Inhalation toxicity

5. A part per million (ppm) is equal to about --
☐ a. 1 gallon in 3,906 gallons
☐ b. 20 gallons in 3,906 gallons
☐ c. 1 tablespoon in 3,906 gallons

6. The amount of chemical required to kill one-half (50 percent) of a test population animals may be called the "lethal dose" or LD₅₀.
☐ a. True
☐ b. False

7. A chemical with an LD₅₀ of 2 mg/kg is _____ toxic than a chemical of 200 mg/kg.
- _____ a. Less
_____ b. More
8. When a pesticide is mixed with water, the toxicity of the mixture _____ as the amount of water increases.
- _____ a. Decreases
_____ b. Remains the same
_____ c. Increases
9. Referring to table 1, you would expect the oral toxicity of table salt to be about _____ toxic than Velpar L.
- _____ a. 2 times more
_____ b. 2 times less
_____ c. 4 times less
10. Referring to table 1, the estimated oral LD₅₀ for Tordon 101-R, as in the container, for a 175 pound person is about 18 ounces (about 1 pint).
- _____ a. True
_____ b. False
11. The common way(s) pesticides can enter the human body are by --
- _____ a. Mouth
_____ b. Skin, including the eyes
_____ c. Lungs
_____ d. All of the above, a, b, and c
12. Referring to table 1, Roundup is considered to be --
- _____ a. Extremely toxic
_____ b. Slightly toxic
_____ c. Moderately toxic

Answers to this Self Test are on page 39.

PESTICIDE LABELLING AND REGISTRATION

Half a century ago, when a new chemical came into use, the main question was how well it did the job it was meant for. Very little attention was given to its possible effects on human beings or the environment. Before 1930, the first person exposed to a toxic chemical might well be its first guinea pig; the exposure came first, then the damage was checked. Today there is a front - line defense against injury, and that is the enormous testing a chemical must go through before it ever reaches the public.

Words and Terms to Understand

Label - Information printed on or attached to a pesticide container.

Labelling - Refers to all printed instructions that come with a pesticide, or that are available to the public.

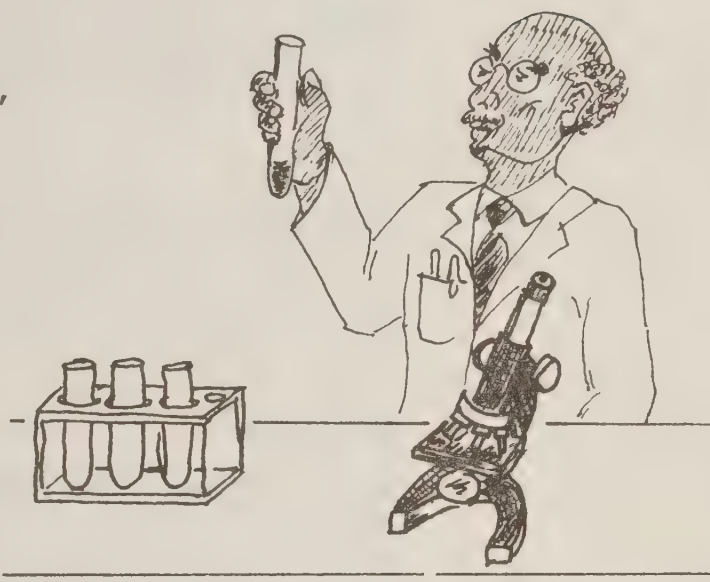
Registration - Approval by the U. S. Environmental Protection Agency (EPA) or a state agency for the use of a pesticide as specified on the label.

Research and Development - Scientific studies that are done before registration and before pesticides can be sold to the public.

Today, before a new pesticide can go into use, or even a label changed, it must meet standards established by the U. S. Environmental Protection Agency (EPA).

For a pesticide to be registered, the company must give the EPA scientific evidence that, when used as directed; it will: (1) not injure human beings, crops, livestock, or wildlife; (2) not damage the total environment; and (3) not leave anything behind (unacceptable residues) in food or feed. There are many other requirements for registration that are too detailed for this discussion.

The research and development that lead to registration and labelling of a pesticide usually take 6 to 10 years. A cost of over \$10 million is not unusual. Research is done to find out how much chemical it takes to control which pests; how toxic it is; and if it will injure human beings, crops, wildlife, or livestock. Studies are made to find out if the chemical will cause cancer, affect offspring, harm the environment, build up in the body, have short-term or long-term effects on human beings, animals, or the environment, and many other possible dangers. To check chronic effects, scientists feed amounts up to near LD₅₀ to animals over a long period of time, and also to several generations of animals to find the effects on offspring.



When research is almost finished, the pesticide may be registered for testing use, called conditional registration. During this time, it may be used in small amounts with its effects closely watched. How does it affect the environment, and the people who apply it? Blood samples, urine tests, and physical examinations may be made on applicators. Even after the pesticide is registered, the EPA, universities, and federal agencies including the Forest Service review its uses and effects.

As you can see, the information on the pesticide label is based on long and careful research. That label cost a lot of time and money. It has been called the most expensive and best researched document there is, and that is probably true.

Forest Service work units have labels and safety data sheets for every one of the pesticides being used. The safety data sheets give safety information for each pesticide. They are usually posted at the pesticide storage building and near a phone at the work center.

It is a Forest Service policy that only registered pesticides can be used on National Forest land, and they must be used the way the requirements

and instructions (labelling) say. This must be your policy when you apply or handle pesticides. Small amounts of new products are sometimes used for testing on National Forests during research.

The label and other labelling information are legal documents which must be followed by everyone using pesticides. There are both civil and criminal penalties for using a pesticide any other way except the way the labelling says.

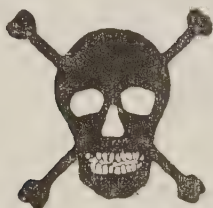
Information on a Pesticide Label

Pesticide labels must follow guidelines laid down by the EPA, and must contain at least the following information (in most cases, even more):

Brand Name - The maker's name for the product.

Signal Words and Symbols - Human hazards show up on the label by signal words (words that signal or warn you) about the toxicity category (group). Each pesticide formulation (what goes into it) is put into a toxicity category that tells how hazardous it is to human health. The categories have swallowed, inhaled, spilled on the skin, or splashed in the eyes.

DANGER POISON



The signal words "DANGER POISON" and the skull and crossbones (symbols) must be on labels of all highly toxic substances (Toxicity Category I). A pesticide may have DANGER on the label and be only slightly toxic. When this is done the reason for the signal words DANGER, WARNING, etc., will appear following the signal word. An example is Velpar L which states DANGER! CAUSES EYE DAMAGE. FLAMMABLE.

The signal word "WARNING" must be on the labels of all moderately toxic pesticide (Toxicity Category II).

The signal word "CAUTION" must be on the labels of all slightly toxic pesticides (Toxicity Categories III and IV).

All labels must say "Keep Out of the Reach of Children."

Precautionary Statement - The label must show a precautionary statement (a warning) which tells you how the product may be hazardous. For example, the statement may say the product is hazardous if splashed in the eyes. So it will tell you to wear goggles. The label may say the chemical is flammable and to keep it away from fire. There are many other precautionary statements. Look for them before handling.

The label will also contain directions for use, how to avoid misuse, list environmental dangers, and other things you need to know to use the pesticide correctly and safely.

THE LABEL IS A TOOL - LEARN HOW
TO READ AND USE IT!

PESTICIDE LABELLING AND REGISTRATION
Self Test #2

1. Today before a new pesticide is introduced for use by the public, it must be registered by --

☐ a. DOL
☐ b. USDI
☐ c. EPA

2. Research and development that lead to registration and labelling of a pesticide may take 6-10 years and it is not unusual to cost in excess of --

☐ a. \$10 million
☐ b. \$1,000
☐ c. \$10,000

3. Before EPA will approve a pesticide for use, research must have been done in many areas, including research to determine if the pesticide causes cancer, affects the offspring, and if it accumulates in the body.

☐ a. True
☐ b. False

4. A pesticide label is not a legal document.

☐ a. True
☐ b. False

5. A pesticide label indicates human hazards through the use of toxicity category signal words. The highly toxic materials are assigned to Toxicity Category I. The signal word(s) for this category are--

☐ a. CAUTION
☐ b. WARNING
☐ c. DANGER - POISON (with symbol skull and cross bones)

6. The label contains a precautionary statement which will tell you ways in which the product may be hazardous. Therefore, a label should be read before using a pesticide.

☐ a. True
☐ b. False

7. It is Forest Service policy that registered pesticides be use on National Forest lands.

- ☐ a. True
- ☐ b. False

8. Before a pesticide is registered for public use it must be tested on animals for chronic effect (long-term).

- ☐ a. False
- ☐ b. True

Answers to this Self Test are on page 40.

1947

is in the same position as the other two

1. This
2. This

3. This
4. This

5. This
6. This

7. This
8. This

9. This

10. This

11. This

12. This

13. This

14. This

SAFETY TRAINING FOR HERBICIDE APPLICATORS

Examination Number 1

Check with the District Pesticide Coordinator for an examination.

The examination is a pass or not-pass examination. A score of 70 percent is passing. If you do not pass, then study the areas again, and when you feel you know the material, request another examination.

HERBICIDES, MIXING AND APPLYING

Herbicides

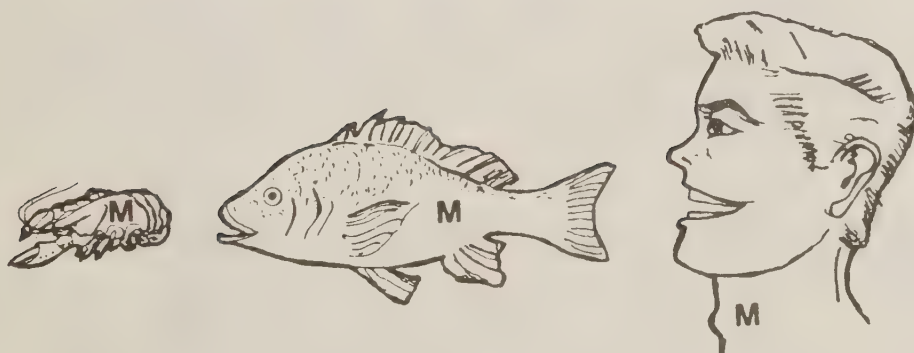
The rest of this booklet will be mostly on herbicides and their use in forestry. Herbicides used by the Forest Service are low in toxicity. They generally control plants (trees) by interfering with the needs of a plant, slowing its growth or killing it. So most herbicides take a fairly long time to show up on the treated plant. Some may not show effects for a month or longer. To judge the full effects of a herbicide you may have to wait 1 year or more after treatment.

Words and Terms to Understand:

Active Ingredient - The chemical or chemicals in a pesticide that do the job, that produce the desired effect.

Accumulate - To build up, to store.

Bioaccumulate - To build up or store, starting with lower forms of life and moving into higher ones. Example: A fish eats a crawfish that is full of the



Bioaccumulate (continued)

chemical mercury; then some of the mercury accumulates in the fish's body after digesting the crawfish. A person eats the fish and some of the mercury that was in the fish accumulates in the person's body. The person eats more mercury-filled fish, and the more he eats the more mercury accumulates in the person's body.

The herbicides used by the Forest Service are not very toxic, and they are not known to accumulate or bioaccumulate in the body. In other words, these herbicides pass through the human body and are lost with waste products.

There are two broad categories of herbicides-selective and nonselective. Selective herbicides are used to kill certain plants such as trees and weeds; they have little or no effect on others. Nonselective herbicides will kill a lot of different kinds of vegetation.

Herbicides get into plants through their leaves, their stems, or their roots. Foliage spray herbicides enter the plant mainly through the leaves. Soil-active herbicides enter through the roots. Injection herbicides enter through cuts made in the plant's bark or stem.

Most herbicides can enter a plant's roots even when it is not labelled as a soil-active herbicide. So you should never spill any herbicides or wash equipment near plants (trees) you do not want to kill.

REMEMBER! A herbicide is no better than the way it is applied. Poor application means loss of time, productivity - and money. And you may damage or kill trees outside the treatment area, called off-site areas.

Some Registered Uses of Herbicides Common to Forestry.

Tordon - The active ingredients in Tordon are picloram only, or picloram and 2,4-D. It is used to control brush, to clear along utility rights-of-way, to control weeds and brush in pastures and range-lands, to control broadleaf weeds in grain fields, in forestry, and has other uses.

- Banvel - Contains the active ingredient dicamba or dicamba and 2,4-D. It is used to control broadleaf weeds in field and silage corn, grain, sorghum, small grains, asparagus, turf, pasture, rangeland and non-croplands such as fence rows, roadways, forestry use, etc.
- Garlon - The active ingredient for Garlon is triclopyr. It is used for controlling woody plants and broadleaf weeds on right-of-ways, forests, industrial sites, etc.
- Roundup - The active ingredient for Roundup is glyphosate. It is used to control many grasses and broadleaf weeds plus trees and woody brush species in cropland and non-cropland sites. A few of the applications include - pre-emergence treatment of alfalfa, edible beans, and English peas; also to control weeds and grasses around apple trees, citrus, grapes, cherries, pears, nut crops. Roundup also is used on right-of-ways, canals, fence rows, forestry, etc.
- Velpar - Velpar contains the active ingredient hexazinone. It is used on railroads, highways, utility and pipeline right-of-ways, and storage areas. Velpar is also used on industrial plant sites, drainage ditch banks, forestry uses, and selective weed control in sugarcane, pineapples, rubber trees, alfalfa, pecans, etc.
- 2,4-D - The active ingredient in 2,4-D is referred to as 2,4-D. It is used on grasses, wheat, barley, oats, sorghum, corn, sugarcane, rice (Philippines), and noncrop areas for post-emergent control of weeds such as Canada thistle, dandelion, annual mustards, ragweed, and lamb's-quarters. Certain formulations are registered for pine release, aquatic weed control and prevention of seed formation, control of weeds in lawns, pastures, golf courses, etc.

The above lists do not include all the uses, but they will give you some idea of the large number of registered uses for each herbicide. And forestry is only one of the minor uses.

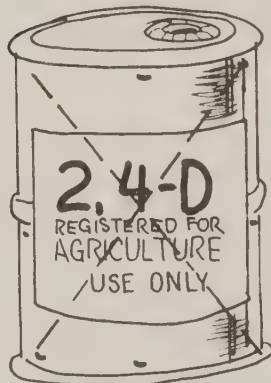
Another thing to be careful about - different uses of one trade name that sounds like another

trade name. Sometimes two herbicides will have the same formulation, and even the same name, but one will be listed for forestry, and one will list another use. You must not use a herbicide for a

purpose that is not on the label - even if you think it will work. For example there is 2,4-D registered for forestry, and there is 2,4-D registered for agricultural use only. It is illegal to use 2,4-D registered for agricultural uses only, in forestry work.



YES



NO

Most of the pesticides used by the Forest Service are herbicides. Pesticides used in forest management represent less than 1 percent of all pesticides used in the United States. That is, government,

industry, private landowner, everybody using pesticides for forestry practices use less than 1 percent of the pesticides used in the nation. Only about one-tenth of one percent of National Forest land is treated each year with herbicides.

Mixing and Applying

ALWAYS READ THE LABEL BEFORE YOU
MIX OR APPLY ANY HERBICIDE.

LOOK FOR PRECAUTIONARY STATEMENTS
AND WARNINGS. HEED THEM.

Use the protective clothing and equipment listed. Forest Service policy requires the use of registered herbicides on National Forest land. Occasionally, for research, some numbered compounds are used on National Forests. Herbicide use must follow label instructions.

At the very least, the herbicide applicator should always wear clothing that is made of tightly-woven cloth - long sleeve shirt, long pants, and a hard hat with plastic liner. Waterproof boots should be worn, as specified by the label. If leather boots are worn, they should be waterproofed with a good sealant. Specific label requirements for protective clothing and equipment shall be followed.

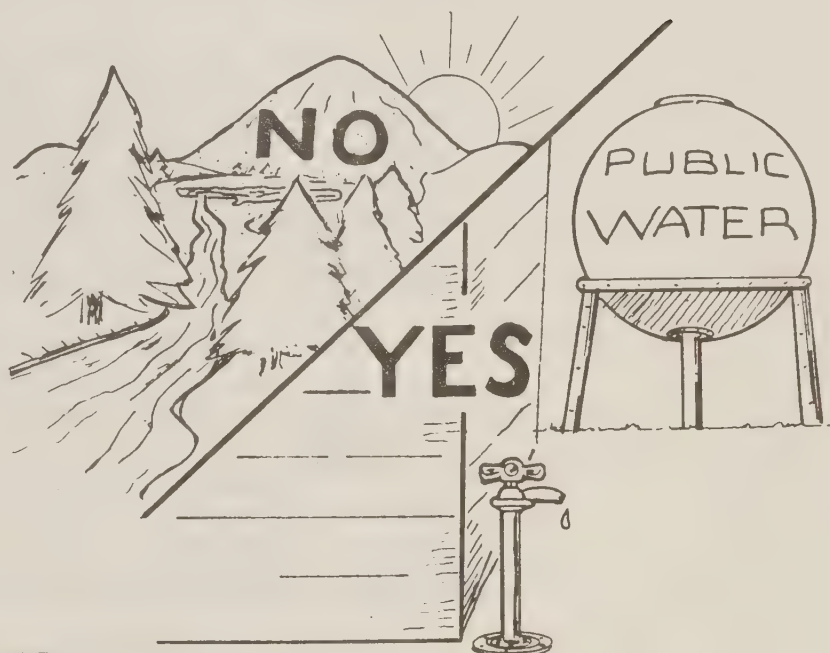
Never put contaminated equipment in your mouth. Nozzles, hoses, anything touched by a herbicide shall be kept away from your mouth. Do not prime siphons with your mouth.

Water for mixing herbicides should come from public water supplies and carried into the field. Never take water from private springs, streams, ponds, or wells. The danger of getting a chemical into someone's water supply (contamination) must be avoided. Even if contamination has not happened, if someone thinks it has, damage has been done.

Before and while applying herbicides, clean wash water should be available for the crew. Soap, towels, eye-wash bottle, gloves, goggles or face shields must be ready as required by the label. There should be a change of clothing (throw-away coveralls like Tivex are good) for a quick change in case of contamination.

If a herbicide gets in the eyes (splashed, from spray, from contaminated hands) wash it out with clean water at once for the length of time the label says. This is generally 10 to 15 minutes. Then the eyes should be checked by a doctor.

As we said earlier, herbicides in the container are more toxic and hazardous - than after you mix them with water. If you mix one part herbicide with the same amount of water (1 to 1); one part herbicide to five parts water (1 to 5); or 1 to 20 and so on, the toxicity of the mixture is that much less each time. A 1 to 1 mixture is half as toxic as the unmixed herbicide, 1 to 5 is five times less toxic. When you pour a pesticide from the original container, be sure the wind is blowing from the side - not into your face. And keep the opening in the container below your eye level. Be sure you are wearing protective clothing if called for and using the right equipment.



If you have cuts or skinned places, check with your supervisor before applying herbicides. Small cuts and scrapes may be protected by gloves or a waterproof bandage - but check.

Wash your hands, forearms, and face before you eat, drink, smoke - or rub your tired eyes.

You should change your clothing every day. As soon as you get home, take a shower and change clothes. Wash your work clothes every day - separately, not in with your regular wash.

Every day - before beginning application - check the equipment for leaks, that it is working properly, check calibration, and test sharpness of injector blades. See that nozzles are clean and pointed in the correct direction, and check everything else to be sure you will be working in the safest way. At the end of the work day, clean and check all equipment again.

When working with or near herbicides being sprayed, try to stay upwind from the nozzle, so that the herbicide will be blown away from you.

If medical treatment is needed during herbicide application, take a copy of the label and safety data sheet for the doctor to read. He needs to know that information.

When anyone asks you about herbicides and their uses, send them to your supervisor for answers. If you are absolutely sure you can answer the question and you do, report the contact to your supervisor and tell him what was asked and how you answered.

HERBICIDES, MIXING AND APPLYING
Self Test #3

1. Herbicides are used to control:

- ☐ a. Insects
- ☐ b. Plants
- ☐ c. Rodents

2. The herbicides used in forestry --

- ☐ a. Are mainly for forestry use and have their greater use in forestry.
- ☐ b. Have their least use in agriculture and industry.
- ☐ c. Have their larger use in agriculture and industry.

3. Herbicides used by the Forest Service have a _____ order of toxicity.

- ☐ a. High
- ☐ b. Low

4. If you want to kill only certain plants while having little or no effect on other plants, you would use a --

- ☐ a. Nonselective herbicide
- ☐ b. Either a nonselective or selective herbicide
- ☐ c. Selective herbicide

5. It's safe to wash herbicide application equipment near a tree or other plants you don't want to kill, if the herbicide is not labelled as a soil-active herbicide.

- ☐ a. True
- ☐ b. False

6. The herbicides used by the Forest Service are not known to accumulate in the human body.

- ☐ a. True
- ☐ b. False

7. The herbicide label should _____ be read, precautionary statements, and other instructions for use be followed.
- ☐ a. Sometimes
 - ☐ b. Never
 - ☐ c. Always
8. It is a preferred practice to secure water for mixing herbicides from:
- ☐ a. Private streams or ponds
 - ☐ b. Private wells or springs
 - ☐ c. Both a and b
 - ☐ d. Public water supplies
9. If you have cuts and skin abrasions, there is no need to check with your supervisor before applying herbicides.
- ☐ a. True
 - ☐ b. False
10. The amount of pesticides used in forestry management by the Government, industry, private landowners, etc. represents _____ of the total pesticides used in the United States.
- ☐ a. Less than 1 percent
 - ☐ b. 10 percent
 - ☐ c. 15 percent
11. If a herbicide is splashed into the eyes, it should be:
- ☐ a. Washed out with water at the end of the day.
 - ☐ b. Immediately washed out with water.
 - ☐ c. Of no concern.
12. If 1 gallon of a herbicide is mixed with 20 gallons of water, the toxicity of the resulting mixture is reduced about --
- ☐ a. 20 times
 - ☐ b. 2 times
 - ☐ c. 10 times
13. About _____ of the National Forest lands are treated with herbicides each year.
- ☐ a. Two percent
 - ☐ b. One tenth of one percent
 - ☐ c. Ten percent

Answers to this Self Test are on page 41.

TRANSPORTATION

Safety is of top importance when herbicides are moved from location to location. There is always a chance of damage to containers when loading and transporting; accidental spills can occur. Highway accidents are possible and they can result in spillage.

The following steps can be helpful in safely transporting herbicides:

1. When transporting 50 gallons or more of herbicides, a project safety plan must go along with the shipment. In case of an accident, follow the plan. FSH 2109.12, Chapter 20, (FSM 2153.22).
2. See that the containers are undamaged before and during loading.
3. Take only the amount of herbicides you will need for one day's work. Leave the rest in the storage building. If any herbicide is left over at the end of the day, return it to the storage building.
4. Do not transport herbicides in the passenger section of a vehicle. Put them in pickup truck beds, or on trailers away from the driver and passengers. Keep herbicides away from drinking water, food, seeds, or anything that can become contaminated.
5. Tie down the containers so they will not move around during transportation.
6. From time to time during the trip, check to be sure the containers are not shifting and no spillage has occurred. Stop the truck and go back to look if you are not sure.
7. Keep a shovel on the truck to use for spills.
8. Do not leave a vehicle by itself if it contains herbicides, unless the herbicide can be made safe against theft, damage, and handling. Be especially careful in an area where children are - or where they might come around.

9. Do not cross private fields, or travel across farm lots or private property when transporting herbicides - unless there is no other way. If you must cross private land, get permission of the landowner first.
10. Park the vehicle in the shade at the work site or anywhere else it may sit for a while. Heat can cause pressure to build up inside the containers. They may violently overflow when opened.



11. As in any accident, take care of any injured person first. Do not move an injured person unless you are absolutely sure you won't injure the person more. Remove contaminated clothing and wash off herbicide. If clothing cannot be removed, pour water over the contaminated portion of the body including the clothing. Be sure the wash water (which becomes contaminated) does not further contaminate the person. ALWAYS CHECK FOR EYE DAMAGE AND CONTAMINATION. If the eyes have been contaminated, flush with clean water for at least 10 to 15 minutes.
12. Always try to contain a spill (after you have helped anyone injured). Keep the spill away from streams and other bodies of water. Most of the time, this can be done by using a shovel, shoveling up a dike or dam of earth around the liquid and spreading soil over it.
13. Always notify the district ranger's office when an accident occurs.
14. KEEP PEOPLE AWAY FROM ACCIDENTS WHERE HERBICIDES ARE SPILLED.

TRANSPORTING HERBICIDES
Self Test #4

1. On Mondays, you should load the transport vehicle with a week's supply of herbicides. Then leave all leftover herbicides on the vehicle at the end of the day.

☐ a. True
☐ b. False

2. Herbicides should be transported inside --

☐ a. Passenger vehicles
☐ b. Truck beds or trailers
☐ c. Either a or b

3. It's all right to leave herbicides unsecured in a vehicle, because no one will be interested in taking them.

☐ a. True
☐ b. False

4. It's an acceptable policy to cross private lands, or through farm lots when transporting herbicides, to save time in traveling to work sites.

☐ a. True
☐ b. False

5. Excessive heat from the sun can cause pressure to build up in a herbicide container, which could cause violent overflow when the container is opened. So park the vehicle in the shade.

☐ a. True
☐ b. False

6. If an accident occurs and a herbicide is spilled on someone, the contaminated clothing should be removed and the herbicide washed off with soap and water. Also, if the eyes have herbicide in them, flush with water for at least --
- ☐ a. 2 minutes
 - ☐ b. 5 minutes
 - ☐ c. 10-15 minutes
7. It is a good policy to always have soap, water, towels, eyewash container, and a shovel on a vehicle transporting herbicides.
- ☐ a. True
 - ☐ b. False

Answers to this Self Test are on page 42.

STORAGE AND SPILLS

Storage

Pesticides should be stored in a building set aside for that purpose. There should be a sign on it, saying that it is a pesticide storage building. There should be a water supply that is easy and quick to reach, and plenty of material like kitty litter that will soak up liquids. The floor should be concrete sloping to a drain with a sump big enough to hold the contents of the largest container stored in the building. There should be an easy way for air to get in and out (good ventilation). The storage building should not be near any other buildings.

Storage Procedures Which Should be Followed.

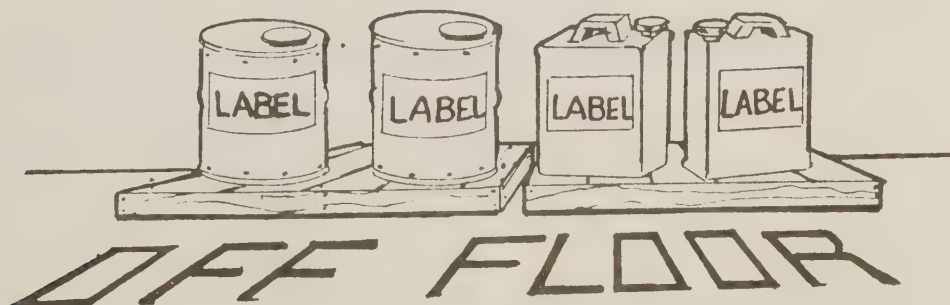
Do not eat, drink, or smoke in the storage building.

Always lock the door of the herbicide storage building.

Never store food, feed, seeds, drinking water, clothing, paint, gasoline, fertilizer or anything but pesticides and their application equipment in the storage building.

Always store herbicides in correctly labelled containers with the labels out where you can read them. Never store herbicides in food or drink containers.

Store herbicides, especially those in metal containers, up off the floor to keep them from rusting.



Check containers frequently to be sure lids are tight and that containers are not damaged or leaking. Report to your supervisor any damaged or leaking containers.

Report to your supervisor if any liquid is in the sump.

Keep an up-to-date list of everything stored in the building. This inventory should be posted on the building and near the phone at the work center. Emergency phone numbers should be posted along with instructions to follow in case of fire.

If the storage building catches fire, call the fire department at once. Also call the person in charge of the building and the district office. Do not aim heavy streams of water on the building; this could wash herbicides into streams, onto farm fields, homes, and other land. Do spray mists of water or dry fire-fighting material to help keep the fire from spreading. Do not breathe the smoke or fumes. Shovel up dirt to make a dam-dike on the lower side of the building to stop runoff. A fire tractor will do this job rapidly.

Your supervisor will give you more information about fires.

Spills

Spills can happen any time you handle, store, move, or use herbicides. When a spill occurs, notice two things: how big the spill is, and where it will flow. Your actions will depend on its size, and what may be contaminated unless stopped.

Small spills may need only a spot clean-up. A large spill near a road bank or ditch calls for greater clean-up. When a large spill happens, call your supervisor or district office at once. Use your shovel; work fast to keep the spill from draining into streams or any body of water. Spread soil over the liquid. Keep people away. For more details see FSH 2109.12. Learn what to do.

Some Management Procedures for Minor (Small) Spills

Take care of any injured or contaminated person. Remove contaminated clothing at once. Wash

herbicide from skin, and use eye wash bottle to clean eyes. Have someone call your supervisor or district office.

Do not leave the area unless someone is left to warn people of the danger. Someone may slip and fall into the herbicide, not knowing what it is.

Shovel up a dike around the spill. Use kitty litter (have it with you), slaked lime, saw dust, soil, or other material that will soak up liquid (absorbent material).

Get up as much of the liquid as you can with absorbent material. Then clean up the rest with soap and water. If the spill gets on soil and contaminates it, shovel up the top few inches and put it in a water-tight bag or container (have some with you). Have your supervisor check the area and tell you what to do with the bag of soil and other contaminated material.



NOTIFY YOUR SUPERVISOR
OR DISTRICT OFFICE
AT ONCE
WHEN A SPILL OCCURS

STORAGE AND SPILLS
Self Test #5

1. After loading the day's work supply of herbicides, the building should be --

☐ a. Left unlocked in case someone else needs to use the building.
☐ g. Locked.
2. It is an acceptable practice to store the drinking water container in the pesticide storage building.

☐ a. True
☐ b. False
3. It is acceptable to smoke in the pesticide storage building because the herbicides are not flammable.

☐ a. True
☐ b. False
4. If the sump inside the storage building contains a liquid, you should --

☐ a. Report this to your supervisor.
☐ b. Not be concerned.
5. If herbicide is spilled inside the pesticide storage building --

☐ a. Don't be concerned because it's inside the storage building.
☐ b. If it drains into the sump, don't be concerned about cleaning it up.
☐ c. Immediately clean it up.
6. After cleaning a small herbicide spill from the work center concrete parking lot, the clean up materials, contaminated kitty litter, mops, etc. should be --

☐ a. Placed in the work center trash container.
☐ b. Placed in water-tight containers for proper disposal.
☐ c. Don't be concerned about cleaning up the spill because it's outside a building.

7. An up-to-date inventory of pesticides in the storage building should be posted on the building and near a phone at the work center.

- ☐ a. True
- ☐ b. False

Answers to this Self Test are on page 43.

DISPOSAL OF CONTAINERS

This section will cover the disposal of forestry herbicide containers only. Follow these rules when disposing of herbicide containers:

Rinse empty containers three times. "Empty" herbicide containers are like "unloaded" guns;

they always have something in them. Herbicide containers always contain small amounts of chemicals. Fill the container at least $\frac{1}{5}$ with water and slosh it around, making sure the water touches all parts of the container.

If herbicides are mixed with water for a spray job, pour the rinse water into the spray tank and apply it on the area being treated. If the herbicide is mixed with diesel or other oil, check with your supervisor on how to rinse.

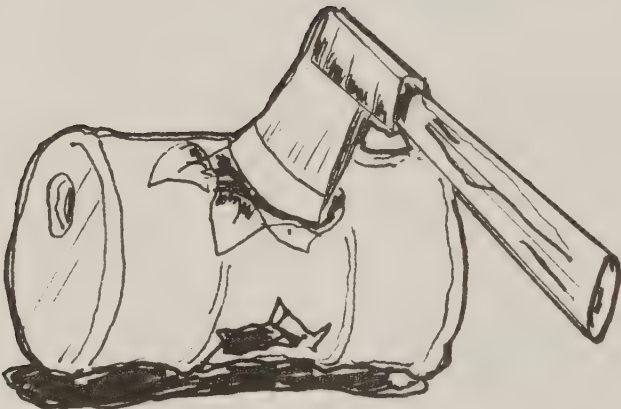
When you are injecting trees or spraying stumps using a ready-mixed herbicide such as Tordon

101R or Banvel CST, spread the rinse water thinly over the area you are injecting or treating. Keep it away from crop trees or plants.

Never reuse herbicide containers to hold anything else. Sometimes metal containers (55-gallon drums) may be returned to a supplier.

Store empty containers and waste materials until you or your supervisor can dispose of them. Never leave them exposed on the work site.

Before disposal, punch holes in metal or plastic containers, and flatten them. Break glass containers. Be sure they cannot be reused.

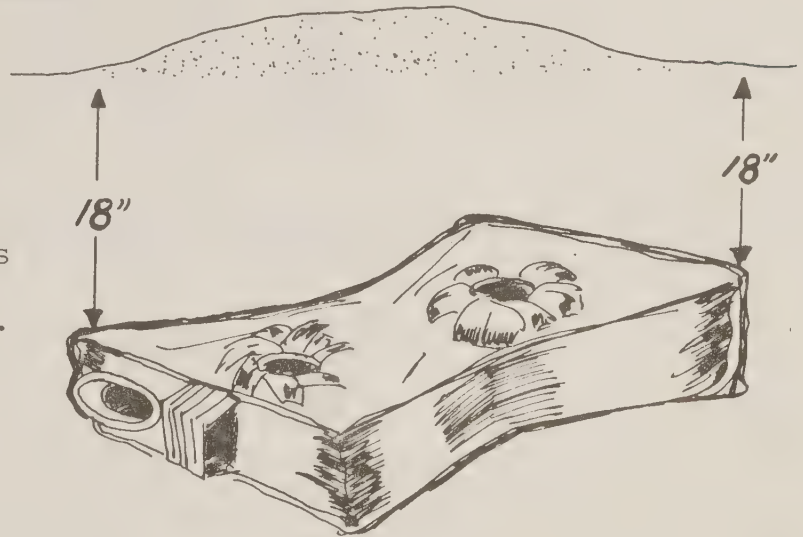


Rinsed and destroyed containers may be disposed of in an approved sanitary land fill.

You may bury rinsed and destroyed containers. Bury them at least 18 inches deep. Find an area where the soil is medium textured, and high in organic matter. Stay away from streams and other water. It is best to bury them on the site where herbicides have been applied or will be applied.

If state and local regulations permit, small quantities of some containers may be burned.

YOUR SUPERVISOR HAS MORE
ON THIS SUBJECT



DISPOSAL OF CONTAINERS
Self Test #6

1. All empty herbicide containers shall be --
☐ a. Rinsed 1 time
☐ b. Rinsed 2 times
☐ c. Rinsed 3 times

2. It is acceptable to reuse herbicide containers as gasoline cans if they are metal and in good condition.
☐ a. True
☐ b. False

3. A properly rinsed and destroyed herbicide container may be disposed of at an approved sanitary landfill.
☐ a. True
☐ b. False

4. An empty herbicide container may be buried on the herbicide application site without rinsing.
☐ a. True
☐ b. False

Answers to this Self Test are on page 44.

REVIEW OF APPLICATION PRACTICES

The following is a list of some work practices that can help you make safe, problem-free applications. You can undoubtedly think of many others.

Don't cross private property when carrying herbicides. If you must, get permission.

Do not mix herbicides or load equipment on private lands.

Do not get mixing or rinsing water from private wells, springs, streams, ponds, etc. This practice ruins good feelings toward the Forest Service.

Do not clean application equipment or vehicles, and do not rinse containers on private lands, near streams, ponds, or any other natural water sources.

Do not leave empty containers on private lands or the application site. Always dispose of them in the proper manner. Do not give them to people in the community.

Do not leave a vehicle loaded with herbicides on private land.

Do not park your vehicle in an area where the herbicides may be stolen, or where children are likely to be present.

It is better to have a small buffer strip between Forest Service and private lands than risk possible contamination of the private landowner's property.

Report immediately all accidents or incidents involving pesticides to your supervisor. It is much better to report these situations and possibly get chewed out than to suffer later consequences.

Do not use the work center wash area for washing herbicide application equipment or for rinsing pesticide containers. This should be done at the application site.

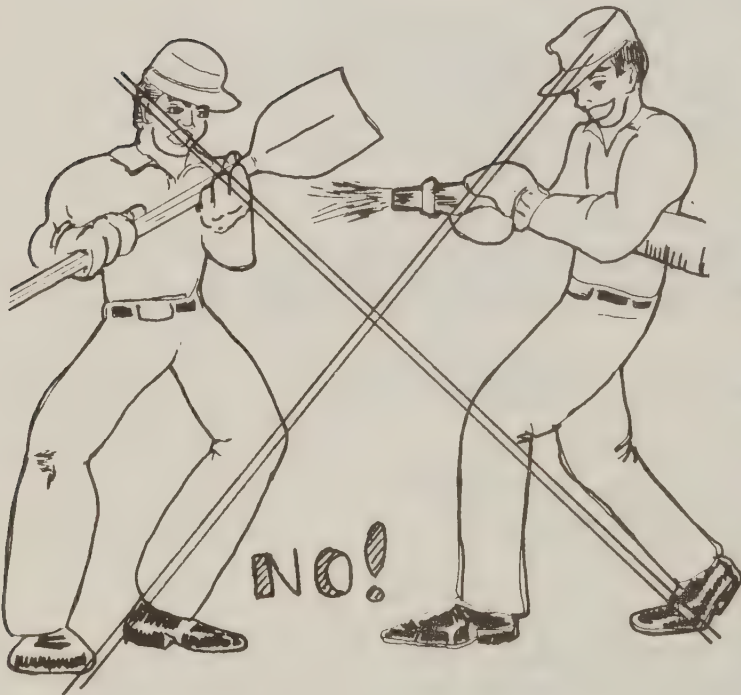
Plan to apply herbicide to an area when the area will not be heavily used. Example: Use care applying herbicides to an unimproved camping area used by deer hunters. Especially do not apply just before the deer hunting season.

Wash work clothes every day - separately from the family wash. Always immediately wash herbicides from any cuts or skinned places on your body.

If medical treatment is required during the period you are applying herbicides, take a copy of the label and safety data sheets with you to the doctor.

To help encourage safety, report to your supervisor any unsafe practices on the job, also any unsafe practices by contractors, permittees, etc.

Horseplay is definitely out when herbicides are involved.



When contacted by anyone regarding herbicides or their uses, refer these individuals to your supervisor, unless you are absolutely certain you can accurately answer their questions. Report any such contacts and what was said to your supervisor as soon as possible.

When setting up herbicide crew vehicles be sure to:

1. Separate drinking water from herbicide mixing, washing or rinse water so contamination will not occur.
2. Carry herbicides separate from passenger compartment.
3. Have available soap, wash water, towels and an eyewash bottle.
4. Have a plastic bag for storage and later disposal of contaminated materials.
5. The vehicle should always have a shovel for cleanup and disposal.

YOUR DISTRICT PESTICIDE COORDINATOR HAS ADDITIONAL AND UPDATED INFORMATION ON PESTICIDES. ASK YOUR COORDINATOR FOR ADDITIONAL READING MATERIAL.

TOXICITY
Self Test #1

Answers and Discussion

1. c. Toxicity - the natural capacity of substance to produce injury.
2. b. If a poisonous substance is continually taken into the body and is not passed with the waste materials, it could build up to a lethal level.
3. b. In 1900, the average life span in the United States was about 47 years, today it is over 70 years.
4. a. Dermal toxicity is referred to as the ability of a chemical to produce injury if passed through the skin.
5. c. One part in a million is equal to about 1 tablespoon in 3,906 gallons.
6. a. True.
7. b. As the mg/kg decrease the toxicity increases; therefore, a chemical with an LD₅₀ of 2 mg/kg chemical is more toxic than one with LD₅₀ of 200 mg/kg.
8. a. As the amount of water added to a pesticide increases, the toxicity of the mixture decreases.
9. a. The oral LD₅₀ of table salt is about 9 ounces and Velpal L, in the container, is about 20 ounces for a 175-pound person. Therefore, table salt is about twice as toxic as Velpar L.
10. a. True. You can project that if a 175-pound person drank about 18 ounces (about 1 pint) of Tordon 101R from the container, it would have a 50 percent chance of killing that person - if the victim did not vomit up the chemical, receive medical treatment, etc.
11. d. There are three common ways in which pesticides enter the human body, through the skin, including the eyes; the mouth; and the lungs.
12. b. Roundup is considered to be slightly toxic in the container. When Roundup is mixed with water, the toxicity of the mixture is even decreased more.

PESTICIDE LABELLING AND REGISTRATION

Self Test #2

Answers and Discussion

1. c. Environmental Protection Agency (EPA) is correct.
2. a. It is not unusual for a company to spend over \$10 million in research and development for a pesticide registration.
3. a. True.
4. b. False. A pesticide label is a legal document which must be followed by anyone using a pesticide.
5. c. "DANGER POISON" and the skull and crossbones are required on the labels of all highly toxic substances, CATEGORY I.
6. a. True. Everyone should read and be familiar with the product label before using the pesticide, so as to apply the chemical in a correct manner and protect themselves and the environment.
7. a. It is Forest Service policy that only registered pesticides be used on National Forest lands, and that they be used in accordance with requirements and instructions.
8. b. The chronic (long-term) effects of pesticides are tested on animals as well as the effects on several generations of offspring before registration for public use.

HERBICIDE, MIXING AND APPLYING
Self Test #3

Answers and Discussion

1. b. Herbicides are substances that kill or control plants. Insecticides kill insects. Rodenticides kill rodents.
2. c. The largest use of herbicides is in agriculture and industry; forestry is a rather small use.
3. b. The Forest Service uses herbicides that have a low order of toxicity.
4. c. Selective herbicides kill or affect only certain trees or grasses while having little or no effect on other plants.
5. b. False. Most of the herbicides we use can move a short distance through most soil and can be picked up by the roots of plants, even though the herbicide is not labelled as a soil-active chemical herbicide.
6. a. True. They pass through the body, and are passed from the body with the waste products.
7. c. A label should always be read and the instructions followed.
8. d. If the water is secured from private streams, ponds, wells, or springs, we can be accused of contamination even though it is not true.
9. b. If you have cuts and skin abrasions, check with your supervisor before applying herbicides.
10. a. The amount of herbicides used in forest management represents only a small percentage of the pesticide used in the United States.
11. b. Herbicides splashed into the eyes should always be immediately washed out, usually for 10-15 minutes.
12. a. The mixture contains about 20 times more water than herbicide, so its toxicity is reduced by about 20 times.
13. b. Only a small part of the total National Forest lands are treated each year with herbicides (one-tenth of one percent).

TRANSPORTING HERBICIDES
Self Test #4

Answers and Discussion

1. b. False. A day's supply of herbicides should only be transported to the work site, and any left over at the end of the day returned to the storage building.
2. b. Transport herbicides in truck beds, or trailers separated from the driver and any passengers.
3. b. False. Herbicides are expensive so someone may take them for their own use or to sell. Children may take them out of curiosity.
4. b. False. Never travel across private lands when transporting herbicides, unless absolutely necessary.
5. a. True. Always be cautious when opening a herbicide container in hot weather, especially if the container appears to be expanded (swollen). Never point the opening toward your face.
6. c. The eyes should always be flushed with clean water at least 10-15 minutes using an eyewash container. Check the label for specific instructions.
7. a. True. This is a minimum list of emergency items in case of an accidental spill.

STORAGE AND SPILLS
Self Test #5

Answer and Discussion

1. b. The pesticide storage building should remain locked when not in use.
2. b. False. Only pesticides and their application equipment should be stored in the building.
3. b. False. Some herbicides are flammable.
4. a. If the sump inside the storage building contains any amount of liquid, report this to your supervisor immediately.
5. c. Spills should be immediately cleaned up.
6. b. Clean up materials must be placed in water-tight containers and your supervisor notified so he or she can provide for proper disposal. Any herbicide spill should be cleaned up. Always report spills to your supervisor.
7. a. True. An inventory of the pesticides in the storage building should be posted on the building and near a phone at the work center.

DISPOSAL OF CONTAINERS
Self Test #6

Answers and Discussion

1. c. All empty herbicide containers shall be rinsed three times with water.
2. b. False. Herbicide containers must not be reused for anything other than their intended purpose.
3. a. True.
4. b. False. Herbicide containers that have been rinsed three times, and destroyed may be buried on application sites.

SAFETY TRAINING FOR HERBICIDE APPLICATORS

Examination Number 2

Check with the District Coordinator for an examination.

The examination is a pass or not pass test.
A score of 70 percent is passing. If you do
not pass, then study the areas again, and
when you feel you know the materials, request
another examination.

EMPLOYEE'S NAME _____ DATE _____

Suggested items to be covered by employee's supervisor within two weeks after the initial training.

_____ Discussion of the labels and safety data sheets for the herbicides the employee will be using.

_____ Set-up for field herbicide vehicle--
--Drinking water.
--Wash water, soap, towels.
--Change of clothing or coveralls.
--Eyewash container and how to use it.
--Safety glasses.
--Other safety items as appropriate.

_____ Appropriate dress for application.

_____ Herbicide application equipment--its safe use, calibration, cleaning, storage, etc.

_____ Loading, securing, and transporting the herbicides.

_____ The uses for the pesticide storage building.

_____ Emergency telephone numbers.

_____ Other items or areas covered.

Do you consider the employee's understanding in these areas to be satisfactory? _____yes _____no

If no, state what training is planned to bring the employee's knowledge to a satisfactory level _____.

After the above additional training, do you consider the employee's knowledge to be satisfactory? _____yes _____no

If the answer again is no, discuss the situation with your supervisor.

Supervisor's Signature

Date



The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product to the exclusion of others that may be suitable.

CAUTION: Use pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers. Some States have restrictions on the use of certain pesticides. Check your local and State regulations. Also, because registrations of pesticides are under constant review by the Environmental Protection Agency, consult your State forestry agency, county agent, or State extension agent to be sure the intended use is still registered.



Use Pesticides Safely

FOLLOW THE LABEL

U.S. DEPARTMENT OF AGRICULTURE

* NATIONAL AGRICULTURAL LIBRARY



1022468270